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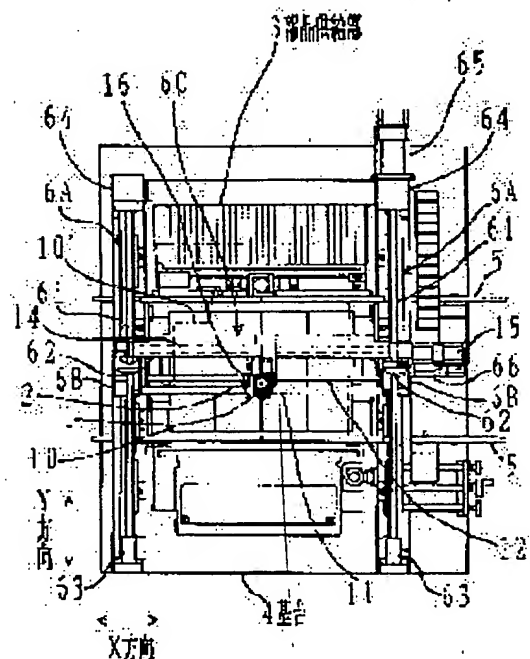
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(54) ELECTRONIC COMPONENT MOUNTING DEVICE

(57)Abstract:

PURPOSE: To provide an electronic component mounting device of a structure, wherein a printed board in the middle of transfer and a mounting head are adjusted a timing at a prescribed position, the movement of the mounting device is slowed down by a board stopper provided on the mounting head, the head is made to stop, a shock to the board is absorbed and even if there are partially mounting finished components, the printed board is made to stop at a prescribed position without generating a positional deviation.

CONSTITUTION: A board stopper 2 is held on a mounting head 1 and the head 1 is moved by an X-Y driving mechanism in synchronization with a printed board 10 in the middle of transfer on a board transfer path 5. Moreover, a rod of the stopper 2 is kept projected to come into contact to the point of the board 10 in a state that the transfer speed of the board 10 is close to the moving speed of the head 1, the movement of the head 1 is slowed down by the stopper 2 while the transfer of the board 10 is stopped, the head 1 is made to stop and the board 10 is made to stop at a prescribed position.



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CLAIMS

[Claim(s)]

[Claim 1] In the electronic-parts wearing equipment containing the wearing head which moves and equips the specified location on the printed circuit board taken up and positioned with the predetermined electronic parts of the substrate conveyance section which conveys and positions a printed circuit board, and a components feed zone It has the substrate stopper which the inhibition member which is held at said wearing head and prevents conveyance of a printed circuit board is made to frequent. Where it took out the inhibition member of said substrate stopper, it moved said wearing head synchronizing with conveyance of the printed circuit board of said substrate conveyance section and the front end of the conveyance direction of a printed circuit board is contacted to said inhibition member Electronic-parts wearing equipment characterized by slowing down migration of said wearing head and stopping a printed circuit board in a predetermined location.

[Claim 2] Electronic-parts wearing equipment according to claim 1 which starts taking out the inhibition member of said substrate stopper and moving said wearing head synchronizing with conveyance of the printed circuit board of said substrate conveyance section if said substrate conveyance section is equipped with a substrate sensor and the printed circuit board conveyed is detected.

[Claim 3] Said substrate conveyance section is electronic-parts wearing equipment according to claim 1 which has a positioning means to insert a criteria pin in the locating hole of a printed circuit board in this predetermined location, when it is in the condition of having contacted the front end of the conveyance direction of a printed circuit board to said inhibition member, migration of said wearing head is slowed down and a printed circuit board is stopped in a predetermined location.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention holds electronic parts by the wearing head, and relates to the equipment with which it transfers and equips on a printed circuit board. Furthermore, the components feed zone which has arranged and held two or more electronic parts in detail, The wearing head with which takes up the predetermined electronic parts held in this components feed zone, and is made to move these electronic parts to the predetermined location on a printed circuit board, and it equips on this printed circuit board, It positions in the predetermined location established in the range in which conveys said printed circuit board and said wearing head moves, and is related with the electronic-parts wearing equipment which has the substrate conveyance section which conveys again said printed circuit board which wearing of electronic parts completed, and is sent out to the following process after that.

[0002]

[Description of the Prior Art] Conventionally, the chuck (adsorption, maintenance) of these electronic parts is carried out to JP.62-214692.A from centering which is the location which a wearing head is fixed to the soffit of the direction slider of Y of an X-Y table head, and this wearing head can move freely in the printed circuit board upper part, then receives electronic parts, and the direction turning device of arbitration, and the electronic-parts stowed position on a printed circuit board is equipped. On the other hand, it is stopped and positioned by the position, said wearing is performed, after that and substrate conveyance starts the printed circuit board transported by the substrate conveyance section, and the electronic-parts wearing equipment with which the following printed circuit board is transported to a predetermined halt location is shown.

[0003] Moreover, after driving a wearing head in the direction of X-Y with a X-Y drive and completing all wearing of the electronic parts to a printed circuit board, the electronic-parts wearing machine which discharges an old printed circuit board and accepts the following printed circuit board in the conveyance section is shown in JP.5-152798.A.

[0004]

[Problem(s) to be Solved by the Invention] By the way, such the substrate conveyance section is what formed the band conveyor in the medial surface to which the substrate side support frame set up by parallel counters on a pedestal, respectively, and from a substrate halt location, i.e., the location which positions a substrate, a gage pin inserts it in the locating hole of a printed circuit board, and it constitutes the substrate support device which supports a printed circuit board so that it may not move, for example. Thus, with a band conveyor and the electronic-parts wearing equipment which pushes up and has the device of positioning, the both sides of a printed circuit board are respectively put on said band conveyor, and it conveys to a substrate halt location. Then, the substrate is stopped by making a slowdown and substrate stopper of a band conveyor halt actuation of the substrate in the location which positions a substrate collide with a substrate.

[0005] However, in order to prevent a location gap of components [finishing / already / wearing / in part] 1) Since the rate of a band conveyor is slowed down, a limitation to shorten the duration of conveyance actuation ** Li, 2) Since the impulse force at the time of the collision of a substrate and a substrate stopper is unabsorbable, it cannot but lower the rate of a band conveyor further, or cannot but select the construction material of a stopper, and cannot but make impulse force small. 3) — even if it tends to wear a substrate stopper out and prepares a spring device etc. in 4 stopper sections — the reaction force at the time of positioning — being generated — the halt location of a substrate — dispersion — in addition — and it has the trouble of ** which conditions change with substrate weight etc. and is not stabilized.

[0006] This invention absorbs the impulse force at the time of a collision, and aims at offering the electronic-parts wearing equipment which cancels the aforementioned trouble by preparing the function which slows down and stops, touching the substrate stopper which was made in view of the above-mentioned point, formed a substrate stopper in a wearing head, took the printed circuit board and the wearing head in the middle of conveyance on the band conveyor, took timing by the position, and formed in a wearing head.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned object, the electronic-parts wearing equipment of this invention In the electronic-parts wearing equipment containing the wearing head which moves and equips the specified location on the printed circuit board taken up and positioned with the predetermined electronic parts of the substrate conveyance section which conveys and positions a printed circuit board, and a components feed zone It has the substrate stopper which the inhibition member which is held at said wearing head and prevents conveyance of a printed circuit board is made to frequent. Where it took out the inhibition member of said substrate stopper, it moved said wearing head synchronizing with conveyance of the printed circuit board of said substrate conveyance section and the front end of the conveyance direction of a printed circuit board is contacted to said inhibition member It is considering as the configuration which migration of said wearing head is slowed [configuration] down and stops a printed circuit board in a predetermined location.

[0008]

[Function] A substrate stopper is formed in a wearing head and a wearing head is moved synchronizing with conveyance of

the printed circuit board of the substrate conveyance section, and the inhibition member of a substrate stopper is taken out to the front end of the conveyance direction of a printed circuit board, and it is made to be the timing to which the bearer rate of a printed circuit board and the passing speed of a wearing head become almost equal, and to contact in the electronic-parts wearing equipment of this invention. If migration of a wearing head is slowed down contacting the front end of the conveyance direction of a printed circuit board to the inhibition member of a substrate stopper, conveyance of a printed circuit board will follow migration of a wearing head. It is controlled by NC control device of electronic-parts wearing equipment, migration of a wearing head can be slowed down in the slowdown curve of arbitration, and conveyance of a printed circuit board can also slow down arbitration.

[0009]

[Example] Hereafter, the example of the electronic-parts wearing equipment concerning this invention is explained according to a drawing.

[0010] In drawing 1 thru/or drawing 7, 10' which is the components feed zone by which a wearing head and 2' were arranged by the substrate stopper and much 3 was arranged for 1 on the pedestal 4, and the substrate conveyance section in which 5 performs conveyance and positioning support of a printed circuit board 10 (a substrate 10 is called henceforth) shows the lower limit of a printed circuit board, and also redoubles spacing of the substrate conveyance section 5 with this dimension in this case.

[0011] Said wearing head 1 guides X-axis drive-system 6C passed and prepared in direction [of Y] head 6B and direction [of Y] head 6B which show around in the direction of Y, drive and move by Y-axis drive-system 6A and Y-axis drive-system 6A which were prepared on the pedestal 4 in the direction of Y, and drive it and it moves. This X-axis drive-system 6C With the X-Y drive 6 which consists of guiding this wearing head 1 in the direction of X which intersects perpendicularly with the direction of Y, driving in it, and moving to it, it shows around in the direction of X-Y, drives, and moves.

[0012] In addition, the field of the substrate 10 positioned in said substrate conveyance section 5 and the migration side by advice in the direction of X-Y by said X-Y drive 6 are parallel, and a substrate 10 is conveyed by this substrate conveyance section 5 from the right of the direction of X on the left.

[0013] In detail, the both sides of each ball screw shaft 61 are supported to revolve with the bearing 63 and bearing 64 of immobilization to the pedestal of each Y-axis drive-system 6A pivotable, and Y-axis drive-system 6A and Y-axis drive-system 6A equip it with them, and attach a motor 65 in the pedestal of right-hand side Y-axis drive-system 6A. The revolving shaft (when it minds a reducer, it is the output revolving shaft) of a motor 65 is combined with the edge which penetrated the bearing 64 of the right-hand side ball screw shaft 61 with well-known power means of communication, such as a shaft coupling. Although not each ball screw shaft 61 is illustrated to each bearing 64 side, it fixes a pulley with a gear tooth respectively, and rotates to one. The power transfer to mutual is enabled in order to lay a belt with a gear tooth between pulleys with both gear teeth and to make it rotate mutually at the same include angle. If a motor 65 is connected with the output of NC control device of electronic-parts wearing equipment and revolution actuation is carried out, each ball screw shaft 61 will rotate at the same include angle. The pitch of thread of each ball screw shaft 61 is the same, and X-axis drive-system 6C which passed direction [of Y] head 6B and direction [of Y] head 6B by which straight-line actuation is respectively carried out through the nut 62 and nut 62 of immobilization, and was prepared in direction [of Y] head 6B and direction [of Y] head 6B is guided in the direction of Y, is driven, and moves.

[0014] Said X-axis drive-system 6C is equipped with the ball screw shaft 12 which carries out straight-line actuation of the guide shaft 11 and the wearing head 1 which support the wearing head 1 for the direction of X, enabling free sliding in the direction of X, and the castellated shaft 14 for making it go up and down the adsorption nozzle 13 which the wearing head 1 has further is added to this X-axis drive-system 6C. In addition, the duty which supports the wearing head 1 for the direction of X with the guide shaft 11, enabling free sliding also has the castellated shaft 14.

[0015] In detail, X-axis drive-system 6C fixes the both sides of the guide shaft 11 to direction [of Y] head 6B, and direction [of Y] head 6B, supports them in the direction of X, and supports the both sides of a castellated shaft 14 to revolve with the bearing fixed to direction [of Y] head 6B, and direction [of Y] head 6B pivotable in parallel with the guide shaft 11. Furthermore, in parallel with the guide shaft 11, the both sides of the ball screw shaft 12 were supported to revolve with the bearing fixed to direction [of Y] head 6B, and direction [of Y] head 6B pivotable, and the guide shaft 11 parallel to mutual, the castellated shaft 14, and the ball screw shaft 12 have penetrated the wearing head 1. Array support of these guide shafts 11, a castellated shaft 14, and the ball screw shaft 12 is carried out in the direction of X, and while the slide bearing which fits in free [sliding] to the guide shaft 11 is fixed by the wearing head 1, the nut 16 screwed in the ball screw shaft 12 is being fixed. Moreover, although not illustrated, the spline nut which has fitted into a castellated shaft 14 is held free [a revolution] in the bearing fixed to the wearing head 1, and the rise-and-fall cam for making this spline nut go up and down the adsorption nozzle 13 fixes, and it rotates to one. A motor 66 is attached in the outside of right-hand side direction [of Y] head 6B. The revolving shaft (when it minds a reducer, it is the output revolving shaft) of a motor 66 is combined with the edge which the ball screw shaft 12 was supported to revolve with the bearing fixed to right-hand side direction [of Y] head 6B, and penetrated with well-known power means of communication, such as a shaft coupling. If a motor 66 is connected with the output of NC control device of electronic-parts wearing equipment and revolution actuation is carried out, the ball screw shaft 12 will rotate, and straight-line actuation is carried out through the nut 16 fixed to this wearing head 1, and the wearing head 1 is guided in the direction of X, is driven, and moves. Furthermore, a motor 15 is attached in the outside of right-hand side direction [of Y] head 6B. The revolving shaft (when it minds a reducer, it is the output revolving shaft) of a motor 15 is combined with the edge which it was supported to revolve with the bearing fixed to right-hand side direction [of Y] head 6B, and was penetrated with well-known power means of communication, such as a shaft coupling, and a castellated shaft 14 connects a motor 15 with the output of NC control unit of electronic-parts wearing equipment, and carries out revolution actuation. In this way, you make one rotate the rise-and-fall cam which the castellated shaft 14 rotated and fixed in the spline nut, and make it go up and down the adsorption nozzle 13 through a cam follower etc.

[0016] Mounting eclipse maintenance of said substrate stopper 2 is carried out at the left lateral of the wearing head 1. That is, let the head of the substrate 10 conveyed by the substrate conveyance section 5 from the right of the direction of X on

the left as shown in drawing 3 thru/or drawing 7 be the location which can be prevented in the soffit of the inhibition member of the substrate stopper 2. An easy example of this substrate stopper 2 can consist of a pneumatic cylinder 22 and a rod 21. It is possible to use the piston rod of a pneumatic cylinder 22 as it is, attaching the member which attaches another member at the head of a piston rod, of course, makes it exchangeable or cannot be easily worn out is also considered, and the rod 21 of an inhibition member is desirable. Only as for the direction which extrudes the direction where a pneumatic cylinder 22 draws a piston rod by the force of a spring, the single-acting pneumatic cylinder, then the Ayr path of pressure Ayr become simple. Although not illustrated, the solenoid valve which opens and closes passage of Ayr in the middle of the Ayr path which connects a pneumatic cylinder 22 from a pressure Ayr supply source is formed, it connects with the output of NC control unit of electronic-parts wearing equipment, and the switching action of this solenoid valve is carried out. If it energizes and opens to a solenoid valve, pressure Ayr extrudes the piston rod of a pneumatic cylinder 22, and projects to the die length from which the rod 21 at a head can prevent conveyance of the substrate 10 on the substrate conveyance section 5. If the path of stop pressure Ayr is closed for energization of a solenoid valve and the Ayr path by the side of a pneumatic cylinder is opened to the exhaust hole of this solenoid valve, a piston rod will withdraw by the force of the spring of a pneumatic cylinder 22, and the rod 21 at a head will withdraw into the die length which does not prevent conveyance of the substrate 10 on the substrate conveyance section 5. It is good if it is possible for a cam to be prepared in the spline nut which rotates with the castellated shaft 14 which makes it go up and down the adsorption nozzle 13 as other examples, and for it to be able to interlock by this cam, to be also able to make the inhibition member of the same substrate conveyance as a rod 21 go in and out, and for other configurations to also make an inhibition member go in and out.

[0017] Said substrate conveyance section 5 equips the conveyance way both sides of a substrate 10 with the band conveyor, and this band conveyor is respectively supported to revolve pivotable in the state of a cantilever on the side face of the frame 51 fixed on the pedestal 4, and arranges two or more rollers 52 on it, and it attaches anchoring and a motor 54 in a frame 51 through a fixture. To the revolving shaft (when it minds a reducer, it is the output revolving shaft) of a motor 54, the pulley which is not illustrated is fixed pivotable, the endless belt 53 is laid between this pulley and two or more above mentioned rollers 52, and if a motor 54 is driven and a revolving shaft is rotated, the endless belt 53 can be driven through this pulley. The frame 51 of both sides is arranged in the direction of X across the conveyance way of a substrate 10 at parallel, and is fixed on a pedestal 4. Then, it has the configuration which lays [firmly] the above-mentioned endless belt 53 across each side face which faces each other, and is driven with a motor 54. The substrate 10 conveyed lays the both-sides underside of the direction of Y in the endless belt 53 of each side, and is supported, and it has independently the side face or guide member of a frame 51 of each side, and rather than the direction width of face of Y of a substrate 10, a both-sides end face is regulated widely slightly, and is always conveyed by parallel in the direction of X. In addition, although the direction width of face of Y is also various since various magnitude exists in a substrate 10, and one frame 51 is fixed on a pedestal 4 in that case, the frame 51 of another side can respond with constituting the location of the direction of Y possible [a parallel displacement] to one frame 51 (JP,6-29696,A). If each motor 54 attached in the frame 51 of both sides is connected with the output of NC control device of electronic-parts wearing equipment and revolution actuation is carried out simultaneously, a substrate 10 will be laid in the endless belt 53, and will be conveyed from the right of the direction of X on the left.

[0018] In addition, 7 is used in order to obtain the timing which detects the substrate 10 from which a mounting eclipse and this substrate sensor 7 are conveyed by the frame 51 by the substrate conveyance way 5 by the substrate sensor by the position, and starts actuation of the substrate stopper 2. If a substrate 10 arrives at the detection region of a photosensor by the photosensor of for example, a reflective mold, the substrate sensor 7 will detect the reflected light from the front face of a substrate 10, and will tell the detecting signal to the input edge of NC control unit of electronic-parts wearing equipment.

[0019] The 2nd criteria pin 56 which can go up and down freely in the 2nd criteria location is formed so that it can insert in the 1st locating hole of a substrate 10 and can insert in the 1st criteria pin 55 which can go up and down freely in the 1st criteria location, and the 2nd locating hole of a substrate 10 as a positioning means of a substrate 10. The upper bed of the criteria pin 55 of these 1st and the 2nd criteria pin 56 is a taper-like, goes up from the substrate 10 bottom, and is inserted in a locating hole. Therefore, even if the location which prevented conveyance of a substrate 10 differs in the substrate stopper 2, predetermined within the limits is satisfactory. Moreover, the both-sides top face of the direction of Y of a substrate 10 is regulated on the underside of the guide member after being fixed to a frame 51, and the 1st criteria pin 55 penetrates the guide block 57 of immobilization on the frame 51 of the side always (in the case of corresponding to the direction width of face of Y of a substrate 10) fixed on a pedestal 4, and goes up and down on it. In the linear guide 58 fixed to the frame 51 of the side always fixed on a pedestal 4, the 2nd criteria pin 56 penetrates the movable block 59 which can slide in the direction of X (the conveyance direction of a substrate 10) which met the frame 51 freely at parallel, and goes up and down. Although not illustrated, rise-and-fall actuation of the criteria pin 55 of these 1st and the 2nd criteria pin 56 is being interlocked with rise and fall of the substrate susceptor which supports the underside of a substrate 10 when equipping a substrate 10 with electronic parts. That is, although rise-and-fall actuation of the substrate susceptor is carried out in the pneumatic cylinder of immobilization on a pedestal 4, the side attached in this substrate susceptor is engaging with the lower part of the 1st criteria pin 55 and the 2nd criteria pin 56. In addition, this side has fitted in between the rollers of the couple pivoted in the lower part side of the 2nd criteria pin 56. Therefore, since the 2nd criteria pin 56 is interlocked with the movement toward the upper and lower sides of substrate susceptor, it can go up and down it and it is moreover engaging with the side through the roller of a couple, a motion of a longitudinal direction (the direction of X) is barred. It can respond by the device in which the 2nd criteria pin 56 is moved to the difference of spacing of the 1st locating hole of a substrate 10 and the 2nd locating hole accompanying the various magnitude of a substrate 10 in a longitudinal direction. In addition, on substrate susceptor, two or more substrate support pins are being fixed. Moreover, it connects with the output of NC control unit of electronic-parts wearing equipment, and the solenoid valve which opens and closes the Ayr path of the pneumatic cylinder which goes up and down substrate susceptor is controlled.

[0020] In the configuration of the above example, migration of the direction of X of the wearing head 1 can be performed by rotating the ball screw shaft 12 of X-axis drive-system 6C with a motor 66. Migration of the direction of Y of the wearing

head 1 can rotate each ball screw shaft 61 of Y-axis drive-system 6A of the direction of Y, and Y-axis drive-system 6A at the same include angle with a motor 65, and can be performed by carrying out equivalent migration of direction [of Y] head 6B and direction [of Y] head 6B in which X-axis drive-system 6C was carried. Moreover, rise-and-fall actuation of the adsorption nozzle 13 of the wearing head 1 can be performed by rotating a castellated shaft 14 with a motor 15. That is, the spline nut which has fitted into a castellated shaft 14 rotates united with a revolution of a castellated shaft 14, a rise-and-fall cam rotates, and rise-and-fall actuation is performed through devices, such as a cam follower which **** for this rise-and-fall cam. By this rise-and-fall actuation, when the adsorption nozzle 13 of the wearing head 1 is on the predetermined supply location of the components feed zone 3, predetermined electronic parts are taken up and adsorption maintenance is carried out. Moreover, when the adsorption nozzle 13 moves onto the specified location of the substrate 10 by which positioning support was carried out and it positions in the predetermined location of the substrate conveyance section 5 by migration of the direction of X-Y of the wearing head 1, wearing actuation of the electronic parts to a substrate 10 can be performed.

[0021] Drawing 3 thru/or drawing 7 convey a substrate 10 in the direction of the reception arrow head B from a front process in the upstream of the substrate conveyance section 5. Take timing by the position, and where it projected the rod 21 of the mounting beam substrate stopper 2 on the wearing head 1 and the front end of a substrate 10 is contacted on it. If slow down migration of this wearing head 1 from a bearer rate, it is made to stop in a predetermined location, positioning support of the substrate 10 is carried out continuously and the rod 21 of the substrate stopper 2 withdraws into a pneumatic cylinder 22, a series of sequence that said wearing actuation is attained is shown. That is, it is in the condition that the substrate conveyance section 5 can receive a substrate 10 from a front process, and if the need arises, NC control unit of electronic-parts wearing equipment will take out a demand signal to a front process. A front process sends out a substrate 10 in the direction of the arrow head B of drawing 3 by the feeder of a substrate 10 etc., simultaneously, rotates the motor 54 of the frame 51 of both sides, and drives the endless belt 53 of the conveyance way both sides of a substrate 10. This endless belt 53 is driven so that the side which lays a substrate 10 may move in the direction of an arrow head B, it results in the substrate sensor 7 and a substrate 10 is detected, as it is conveyed and is shown in drawing 4. On the other hand, if, as for the mounting beam wearing head 1, actuation of the substrate conveyance section 5 starts the substrate stopper 2, the substrate stopper 2 will be stood by in a down-stream predetermined location rather than the substrate sensor 7 by migration of the aforementioned direction of X-Y in the range of the direction width of face of Y of the conveyance way of a substrate 10. The direction of X of this predetermined location is a location shown in drawing 3. Then, if the substrate sensor 7 detects a substrate 10, a rod 21 is extruded in the direction of arrow-head D shown in drawing 4, and simultaneously, by actuation of the motor 66 of X-axis drive-system 6C, it will accelerate by the direction arrow head H of X gradually, and will move the wearing head 1 to it. The flash when, as for drawing 5, the front end of the conveyance direction of a substrate 10 shows the condition of having contacted the rod 21 of the substrate stopper 2 and which contacts has the bearer rate of a substrate 10, and the equal passing speed to the direction of arrow-head H of the wearing head 1, or controls actuation of a motor 66 in the very near condition. In other words, control which synchronizes migration of the wearing head 1 with conveyance of a substrate 10 is performed, and after the timing to which a rod 21 contacts at the head of a substrate 10, the passing speed to the direction of arrow-head H of the wearing head 1 is slowed down until it controls and suspends a motor 66 in a predetermined slowdown curve. A substrate 10 slips with the endless belt 53, while stopping in the part which positions a substrate 10 with the positioning means of a substrate 10, as immediately shown in drawing 6, the 1st criteria pin 55 and the 2nd criteria pin 56 go up in an arrow head P and the direction of P', and it positions, and support by the substrate support pin is performed. Although actuation of the endless belt 53 stops at this event, the impact to a substrate 10 is timing which is not produced any longer. If positioning of a substrate 10 completes drawing 7, the rod 21 of the substrate stopper 2 withdraws in the direction of arrow-head U, the condition that wearing actuation of the electronic parts to a substrate 10 can be performed is shown and wearing actuation is completed, the positioning means of a substrate 10 will be dropped, and if the endless belt 53 is driven again, a substrate 10 will be conveyed toward the following process.

[0022] The above actuation is controlled by NC control unit of electronic-parts wearing equipment.

[0023]

[Effect of the Invention] Since the printed circuit board which is conveying and moving in the substrate conveyance section by the inhibition member of the substrate stopper formed in the wearing head is slowed down and stopped from a bearer rate according to the electronic-parts wearing equipment of this invention, it becomes possible to lessen the impact accompanying a halt of a printed circuit board by controlling the slowdown curve in migration of a wearing head. In addition, generally it is easy for migration of the wearing head of electronic-parts wearing equipment to be controlled by NC control device, and to control a slowdown curve to arbitration. Moreover, since the conventional wearing head when replacing a printed circuit board can optimize the control which is in a standby condition, and is slowed down and stopped while not making working hours increase even if it carries out this invention, abolishing the slowdown of the conventional band conveyor moreover and maintaining the impact accompanying a halt of a printed circuit board at below fixed, a halt location is stabilized as a result and working hours can be shortened. Moreover, it is possible in the setting-out input to NC control unit without using modification of the halt location at the time of changing to the printed circuit board of a different dimension for a handle, a tool, etc., and modification is easy. Furthermore, always doubling the core of a printed circuit board with a setting-out location (for example, core of the direction of X) can perform automatically irrespective of the dimension of a printed circuit board. Effectiveness will be doubled if spacing modification of a substrate conveyance way and repositioning (JP,6-32432,A) of a criteria pin are simultaneously used together.

[0024]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the top view showing the whole example configuration of the electronic-parts wearing equipment of this invention.

[Drawing 2] It is this front view.

[Drawing 3] It is the front view showing actuation of the substrate conveyance way of an example, a wearing head, a substrate stopper, and a positioning means, and the condition of having started conveyance of a printed circuit board is shown.

[Drawing 4] It is the front view showing actuation of the substrate conveyance way of an example, a wearing head, a substrate stopper, and a positioning means, and the condition that a printed circuit board results in a substrate sensor, and is detected is shown.

[Drawing 5] It is the front view showing actuation of the substrate conveyance way of an example, a wearing head, a substrate stopper, and a positioning means, and the condition that the head of a printed circuit board touched the rod of a substrate stopper is shown.

[Drawing 6] It is the front view showing actuation of the substrate conveyance way of an example, a wearing head, a substrate stopper, and a positioning means, and the condition that a positioning means positions a printed circuit board is shown.

[Drawing 7] It is the front view showing actuation of the substrate conveyance way of an example, a wearing head, a substrate stopper, and a positioning means, and the condition that positioning of a printed circuit board is completed and the rod of a substrate stopper withdraws is shown.

[Description of Notations]

1 Wearing Head

2 Substrate Stopper

5 Substrate Conveyance Section

6 X-Y Drive

7 Substrate Sensor

10 printed circuit boards

21 rods

51 frames

52 rollers

53 endless belt

54 motors

55 -- the 1st criteria pin

56 -- the 2nd criteria pin

B The conveyance direction of a printed circuit board

D The direction from which a substrate stopper takes out a rod

H The direction to which a wearing head moves (at the time of substrate conveyance inhibition)

U The direction from which a substrate stopper withdraws a rod

P The lifting direction of the 1st criteria pin

P' -- the lifting direction of the 2nd criteria pin

X The conveyance direction of a printed circuit board

Y It is parallel to a printed circuit board side, and they are X and a perpendicular direction.

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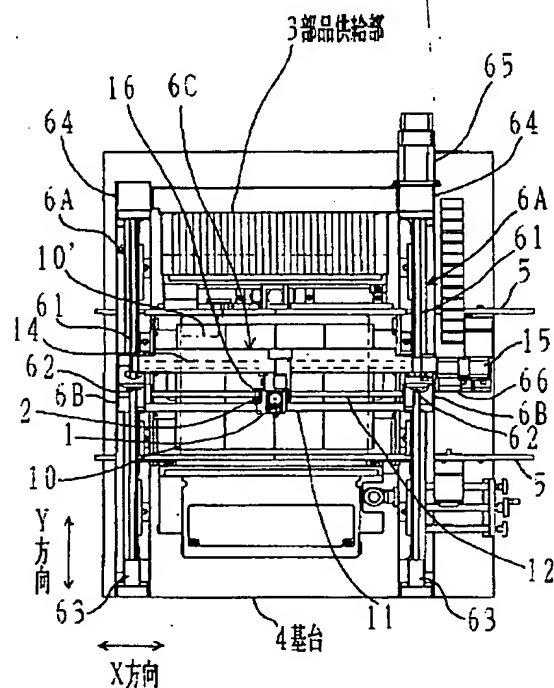
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(54) 【発明の名称】 電子部品装着装置

(57) 【要約】

【目的】 搬送途中のプリント基板と装着ヘッドとを所定の位置でタイミングを取り装着ヘッドに設けた基板ストッパで減速及び停止させ衝撃を吸収し一部分装着済みの部品があっても位置ずれなく所定の位置で停止させる電子部品装着装置を提供する。

【構成】 装着ヘッド1に基板ストッパ2を保持して、基板搬送路5で搬送途中のプリント基板10に同期して装着ヘッド1をX-Y駆動機構6により移動する、また、基板ストッパ2のロッド21を出しておいてプリント基板10の搬送速度と装着ヘッド1の移動速度が近い状態でプリント基板10の先端に接し、搬送を阻止しながら装着ヘッド1の移動を減速し停止させてプリント基板10を所定位置で停止させる。



【特許請求の範囲】

【請求項 1】 プリント基板を搬送して位置決めする基板搬送部と、部品供給部の所定の電子部品をピックアップし位置決めされたプリント基板上の指定位置に移動して装着する装着ヘッドとを含む電子部品装着装置において、前記装着ヘッドに保持されてプリント基板の搬送を阻止する阻止部材を出入りさせる基板ストッパを備え、前記基板ストッパの阻止部材を出して前記基板搬送部のプリント基板の搬送に前記装着ヘッドを同期して移動させ、前記阻止部材にプリント基板の搬送方向の前端を接触させた状態で、前記装着ヘッドの移動を減速しプリント基板を所定位置で停止させることを特徴とする電子部品装着装置。

【請求項 2】 前記基板搬送部に基板センサーを備え、搬送されるプリント基板を検出すると、前記基板ストッパの阻止部材を出して前記基板搬送部のプリント基板の搬送に前記装着ヘッドを同期して移動させることを開始する請求項 1 記載の電子部品装着装置。

【請求項 3】 前記基板搬送部は、前記阻止部材にプリント基板の搬送方向の前端を接触させた状態で、前記装着ヘッドの移動を減速しプリント基板を所定位置で停止させると、該所定位置で基準ピンをプリント基板の位置決め穴に嵌入する位置決め手段を有する請求項 1 記載の電子部品装着装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、電子部品を装着ヘッドにより保持してプリント基板上に移載し装着する装置に関する。更に詳しくは、複数の電子部品を配列し且つ收容している部品供給部と、この部品供給部に收容されている所定の電子部品をピックアップし且つ該電子部品をプリント基板上の所定位置まで移動させて該プリント基板上に装着する装着ヘッドと、前記プリント基板を搬送して前記装着ヘッドが移動する範囲に設けられた所定位置に位置決めし、その後、電子部品の装着が完了した前記プリント基板を再び搬送して次の工程に送り出す基板搬送部を有する電子部品装着装置に関する。

【0002】

【従来の技術】 従来、特開昭 62-214692 号には、X-Y テーブルヘッドの Y 方向スライドの下端に装着ヘッドが固定され、該装着ヘッドはプリント基板上方を移動自在であり、そうして電子部品を受け取る位置であるセンタリング及び任意方向旋回機構から該電子部品をチャック（吸着、保持）して、プリント基板上の電子部品装着位置に装着する。一方、基板搬送部により移送されてきたプリント基板は、所定の位置で停止、位置決めされて前記装着が行われ、その後、また、基板搬送がスタートし、次のプリント基板が所定の停止位置に移送される電子部品装着装置が示されている。

【0003】 また、特開平 5-152798 号には、装

着ヘッドは X-Y 駆動機構で X-Y 方向に駆動され、プリント基板に対する電子部品の装着が全て終了すると、今までのプリント基板を排出して次のプリント基板を搬送部で受け入れる電子部品装着機が示されている。

【0004】

【発明が解決しようとする課題】 ところで、このような基板搬送部は、基台上に平行に立設された基板側支持フレームの対向する内側面にそれぞれベルトコンベアを設けたもので、基板停止位置、すなわち、基板を位置決めする位置では、例えば、プリント基板の位置決め穴に位置決めピンが嵌入し、プリント基板を動かないように支持する基板支持機構を構成している。このようにベルトコンベア及び押し上げ位置決め機構を持つ電子部品装着装置では、プリント基板の両側を前記ベルトコンベアに各々載せて基板停止位置へ搬送する。そうして、基板を位置決めする位置における基板の停止動作をベルトコンベアのスローダウンと基板ストッパを基板に衝突させることにより基板を停止させている。

【0005】 しかし、すでに一部分装着済みの部品の位置ずれを防ごうとするには、1) ベルトコンベアの速度をスローダウンしているため、搬送動作の所要時間を短縮するには限界があり、2) 基板と基板ストッパの衝突時の衝撃力は吸収できないのでベルトコンベアの速度をさらに下げるとカストッパの材質を選定して衝撃力を小さくするしかなく、3) 基板ストッパが磨耗しやすく、4) ストッパ部にばね機構等を設けても、位置決め時の反力が生じ基板の停止位置がばらつき、なおかつ基板重量等により条件が異なると安定しない、等の問題点を有している。

【0006】 本発明は、上記の点に鑑みなされたもので、装着ヘッドに基板ストッパを設けて、ベルトコンベアで搬送途中のプリント基板と装着ヘッドとを所定の位置でタイミングを取り装着ヘッドに設けた基板ストッパを接しながら減速及び停止させる機能を設けることにより、衝突時の衝撃力を吸収して、前記の問題点を解消する電子部品装着装置を提供することを目的とする。

【0007】

【課題を解決するための手段】 上記目的を達成するために、本発明の電子部品装着装置は、プリント基板を搬送して位置決めする基板搬送部と、部品供給部の所定の電子部品をピックアップし位置決めされたプリント基板上の指定位置に移動して装着する装着ヘッドとを含む電子部品装着装置において、前記装着ヘッドに保持されてプリント基板の搬送を阻止する阻止部材を出入りさせる基板ストッパを備え、前記基板ストッパの阻止部材を出して前記基板搬送部のプリント基板の搬送に前記装着ヘッドを同期して移動させ、前記阻止部材にプリント基板の搬送方向の前端を接触させた状態で、前記装着ヘッドの移動を減速しプリント基板を所定位置で停止させる構成としている。

【0008】

【作用】本発明の電子部品装着装置においては、装着ヘッドに基板ストッパを設けて、基板搬送部のプリント基板の搬送に装着ヘッドを同期して移動させ、プリント基板の搬送速度と装着ヘッドの移動速度とがほぼ等しくなるタイミングで、プリント基板の搬送方向の前端に基板ストッパの阻止部材を出しておいて接触させる。プリント基板の搬送方向の前端を基板ストッパの阻止部材に接触させながら装着ヘッドの移動を減速すると、プリント基板の搬送は装着ヘッドの移動に従う。装着ヘッドの移動は電子部品装着装置のNC制御装置で制御されており、任意の減速カーブで減速することが可能であり、プリント基板の搬送も任意の減速を行い得る。

【0009】

【実施例】以下、本発明に係る電子部品装着装置の実施例を図面に従って説明する。

【0010】図1乃至図7において、1は装着ヘッド、2は基板ストッパ、3は基台4上に多数配列された部品供給部、5はプリント基板10（以降は基板10と称す）の搬送及び位置決め支持を行う基板搬送部である、10'はプリント基板の最小寸法を示しこの場合は基板搬送部5の間隔もこの寸法に合わせ直す。

【0011】前記装着ヘッド1は、基台4上に設けられたY軸駆動系6AとY軸駆動系6AによってY方向に案内し駆動され移動するY方向ヘッド6BとY方向ヘッド6Bに渡して設けられるX軸駆動系6CをY方向に案内し駆動して移動し、該X軸駆動系6CがY方向と直交するX方向に該装着ヘッド1を案内し駆動して移動することからなるX-Y駆動機構6でX-Y方向に案内し駆動され移動するようになっている。

【0012】なお、前記基板搬送部5に位置決めした基板10の面と前記X-Y駆動機構6によるX-Y方向の案内による移動面とは平行になっていて、基板10は該基板搬送部5によりX方向の右から左へ搬送される。

【0013】詳しくは、Y軸駆動系6AとY軸駆動系6Aは各々のボールねじ軸61の両側を各々のY軸駆動系6Aの基台に固定の軸受63と軸受64で回転可能に軸支して備え、右側のY軸駆動系6Aの基台には電動機65を取付ける。右側のボールねじ軸61の軸受64を貫通した端部に電動機65の回転軸（減速機を介する場合はその出力回転軸）を軸継手等の周知の動力伝達手段で結合する。各々のボールねじ軸61は各々の軸受64の側に図示しないが各々歯付ブリーを固着して一体に回転する。両歯付ブリー間には歯付ベルトを張架して相互に同一角度で回転させるべく相互に動力伝達可能にする。電動機65を電子部品装着装置のNC制御装置の出力と接続して回転駆動すると各々のボールねじ軸61は同一角度で回転する。各々のボールねじ軸61のねじピッチは同一であり、Y方向ヘッド6BとY方向ヘッド6Bに各々固定のナット62とナット62を介して直線駆動さ

れるY方向ヘッド6BとY方向ヘッド6Bに渡して設けられたX軸駆動系6CはY方向に案内し駆動されて移動する。

【0014】前記X軸駆動系6Cは、装着ヘッド1をX方向に摺動自在に支持するガイド軸11及び装着ヘッド1をX方向に直線駆動するボールねじ軸12を備えており、さらに装着ヘッド1が有する吸着ノズル13を昇降させるためのスプライン軸14が該X軸駆動系6Cに付加されている。なお、スプライン軸14はガイド軸11と共に装着ヘッド1をX方向に摺動自在に支持する役目も合わせ持っている。

【0015】詳しくは、X軸駆動系6Cは、ガイド軸11の両側をY方向ヘッド6BとY方向ヘッド6Bへ固定してX方向に支持し、ガイド軸11に平行してスプライン軸14の両側をY方向ヘッド6BとY方向ヘッド6Bへ固定した軸受で回転可能に軸支する。さらに、ガイド軸11に平行してボールねじ軸12の両側をY方向ヘッド6BとY方向ヘッド6Bへ固定した軸受で回転可能に軸支し、装着ヘッド1を相互に平行なガイド軸11、スプライン軸14及びボールねじ軸12が貫通している。これらのガイド軸11、スプライン軸14及びボールねじ軸12はX方向に配列支持されるものであり、装着ヘッド1にはガイド軸11に対して摺動自在に嵌合するスライド軸受が固定されるとともに、ボールねじ軸12に螺合するナット16が固定されている。また、図示しないがスプライン軸14に嵌合しているスプラインナットは装着ヘッド1に固定された軸受にて回転自在に保持されており、該スプラインナットに吸着ノズル13を昇降させるための昇降カムが固着され一体に回転する。右側のY方向ヘッド6Bの外側には電動機66を取付ける。ボールねじ軸12が右側のY方向ヘッド6Bへ固定した軸受で軸支され貫通した端部に電動機66の回転軸（減速機を介する場合はその出力回転軸）を軸継手等の周知の動力伝達手段で結合する。電動機66を電子部品装着装置のNC制御装置の出力と接続して回転駆動するとボールねじ軸12が回転し、装着ヘッド1は該装着ヘッド1に固定されたナット16を介して直線駆動されX方向に案内し駆動されて移動する。さらに、右側のY方向ヘッド6Bの外側には電動機15を取付ける。スプライン軸14が右側のY方向ヘッド6Bへ固定した軸受で軸支され貫通した端部に電動機15の回転軸（減速機を介する場合はその出力回転軸）を軸継手等の周知の動力伝達手段で結合し、電動機15を電子部品装着装置のNC制御装置の出力と接続して回転駆動する。こうして、スプライン軸14が回転してスプラインナットに固着された昇降カムを一体に回転させカムフォロア等を介して吸着ノズル13を昇降させる。

【0016】前記基板ストッパ2は装着ヘッド1の左側面に取付けられ保持されている。すなわち、図3乃至図7に示す如く基板搬送部5によりX方向の右から左へ搬

送される基板10の先端を基板ストップ2の阻止部材の下端で阻止可能な位置とする。該基板ストップ2の簡単な一例はエアシリンダ22とロッド21で構成することができる。阻止部材のロッド21はエアシリンダ22のピストンロッドをそのまま用いることが可能であり、もちろんピストンロッドの先端に別の部材を取付けて交換可能にしたり、磨耗しにくい部材を取付けることも考えられ望ましい。エアシリンダ22はピストンロッドを引き込む方向はばねの力で押し出す方向のみ圧力エアーの単動エアシリンダとすればエアー経路が単純になる。図示しないが圧力エアー供給源からエアシリンダ22を結ぶエアー経路の途中にエアーの通過を開閉する電磁弁を設け、該電磁弁を電子部品装着装置のNC制御装置の出力と接続して開閉動作させる。電磁弁に通電して開くと圧力エアーがエアシリンダ22のピストンロッドを押し出して先端のロッド21が基板搬送部5上の基板10の搬送を阻止可能な長さに突出する。電磁弁の通電を止め圧力エアーの経路を閉じてエアシリンダ側のエアー経路を該電磁弁の排気孔に開放するとピストンロッドはエアシリンダ22のばねの力で引っ込み、先端のロッド21は基板搬送部5上の基板10の搬送を阻止しない長さに引っ込むこととなる。他の例としては吸着ノズル13を昇降させるスプライン軸14で回転するスプラインナットにカムを設けて、該カムで連動してロッド21と同様の基板搬送の阻止部材を出入りさせることもできるし、その他の構成でも阻止部材を出入りさせることが可能ならばよい。

【0017】前記基板搬送部5は基板10の搬送路両側にベルトコンベアを備えており、該ベルトコンベアは基台4上に固定されたフレーム51の側面に複数のローラ52を片持ち状態で回転可能に各々軸支して配置し取付け、電動機54は取付け具を介してフレーム51に取付ける。電動機54の回転軸（減速機を介する場合はその出力回転軸）には図示しないブリーを回転可能に固着して無端ベルト53を該ブリーと前記した複数のローラ52間に張架し、電動機54を駆動して回転軸を回転させると該ブリーを介して無端ベルト53を駆動することができる。両側のフレーム51は基板10の搬送路を挟んでX方向に平行に配置され基台4上に固定される。そうして、各々の向かい合う側面に前述の無端ベルト53を張架し電動機54で駆動する構成を有する。搬送される基板10はY方向の両側下面を各々の側の無端ベルト53に載置して支持され、両側端面は各々の側のフレーム51の側面あるいはガイド部材を別に備えて基板10のY方向幅よりもわずかに広く規制してX方向に常に平行に搬送されるようにする。なお、基板10には多様な大きさが存在するのでY方向幅も多様であり、その場合は、一方のフレーム51は基台4上に固定するが他方のフレーム51は一方のフレーム51に対してY方向の位置を平行移動可能に構成することで対応することができ

る（特開平6-29696号）。両側のフレーム51に取付けた各々の電動機54を電子部品装着装置のNC制御装置の出力と接続して同時に回転駆動すると、基板10は無端ベルト53に載置されてX方向の右から左へ搬送される。

【0018】なお、7は基板センサーでフレーム51に取付けられ、該基板センサー7は基板搬送路5により搬送される基板10を所定の位置で検出して基板ストップ2の動作を開始するタイミングを得るために用いられる。基板センサー7は例えば反射型の光センサーで基板10が光センサーの検出域に到達すると基板10の表面からの反射光を検出し、その検出信号を電子部品装着装置のNC制御装置の入力端に伝える。

【0019】基板10の位置決め手段として、基板10の第1の位置決め穴に嵌入可能な如く第1の基準位置で昇降自在な第1の基準ピン55及び基板10の第2の位置決め穴に嵌入可能な如く第2の基準位置で昇降自在な第2の基準ピン56が設けられている。これら第1の基準ピン55と第2の基準ピン56の上端はテーパー状であり基板10の下側から上昇して位置決め穴に嵌入する。従って、基板ストップ2で基板10の搬送を阻止した位置がばらついても所定の範囲内は問題ない。また、基板10のY方向の両側上面はフレーム51に固定された上ガイド部材の下面で規制され、第1の基準ピン55は基台4上に（基板10のY方向幅対応の場合）常に固定される側のフレーム51に固定のガイドブロック57を貫通して昇降するものである。第2の基準ピン56は、基台4上に常に固定される側のフレーム51に固定されたリニアガイド58でフレーム51に沿ったX方向（基板10の搬送方向）に平行に摺動自在な可動ブロック59を貫通して昇降するようになっている。これら第1の基準ピン55と第2の基準ピン56の昇降動作は、図示しないが、基板10に電子部品を装着するときに基板10の下面を支持する基板支持台の昇降と連動している。すなわち、基板支持台は基台4上に固定のエアシリンダにて昇降駆動されるが、この基板支持台に取付けられた横板が第1の基準ピン55と第2の基準ピン56の下部と係合している。なお、該横板は第2の基準ピン56の下部側に枢着された一对のローラ間に嵌まっている。従って、第2の基準ピン56は基板支持台の上下の動きに連動して昇降でき、しかも横板に一对のローラを介して係合しているため、横方向（X方向）の動きは妨げられないようになっている。基板10の多様な大きさに伴う基板10の第1の位置決め穴と第2の位置決め穴の間隔の相違に第2の基準ピン56を横方向に動かす機構で対応することができる。なお、基板支持台上には複数本の基板支えピンが固定されている。また、基板支持台を昇降するエアシリンダのエアー経路を開閉する電磁弁は電子部品装着装置のNC制御装置の出力と接続して制御する。

【0020】以上の実施例の構成において、装着ヘッド1のX方向の移動はX軸駆動系6Cのボールねじ軸12を電動機66で回転させることにより行うことができる。装着ヘッド1のY方向の移動は、電動機65によりY方向のY軸駆動系6AとY軸駆動系6Aの各々のボールねじ軸61を同一角度で回転させ、X軸駆動系6Cが搭載されたY方向ヘッド6BとY方向ヘッド6Bを等量移動させることにより行うことができる。また、装着ヘッド1の吸着ノズル13の昇降駆動はスプライン軸14を電動機15で回転することにより行うことができる。すなわち、スプライン軸14に嵌合しているスプラインナットがスプライン軸14の回転と一体となって回転し、昇降カムが回転し、この昇降カムに従動するカムフォロア等の機構を介して昇降動作を行う。この昇降動作により、装着ヘッド1の吸着ノズル13が部品供給部3の所定の供給位置上にあるときは、所定の電子部品をピックアップして吸着保持する。また、装着ヘッド1のX-Y方向の移動によって、基板搬送部5の所定位置に位置決め支持された基板10の指定位置上に吸着ノズル13が移動して位置付けたときは、基板10に対する電子部品の装着動作を行うことができる。

【0021】図3乃至図7は基板10を基板搬送部5の上流で前の工程から受け取り矢印Bの方向に搬送して、所定の位置でタイミングを取り装着ヘッド1に取付けた基板ストッパ2のロッド21を突出して基板10の前端に接触させた状態で、該装着ヘッド1の移動を搬送速度から減速し所定位置で停止させ、続いて基板10は位置決め支持され、基板ストッパ2のロッド21がエアシリンダ22へ引っ込むと、前記装着動作が可能になるという一連の順序を示したものである。すなわち、基板搬送部5が前の工程から基板10を受け入れ可能な状態で、且つ必要が生じると電子部品装着装置のNC制御装置は前の工程に対して要求信号を出す。前の工程は例えば基板10の供給装置等で図3の矢印Bの方向に基板10を送り出し、同時に、両側のフレーム51の電動機54を回転させて基板10の搬送路両側の無端ベルト53を駆動する。該無端ベルト53は基板10を載置する側が矢印Bの方向に移動するように駆動され、基板10は搬送されて図4に示す如く基板センサー7に至り検出される。一方、基板ストッパ2を取付けた装着ヘッド1は基板搬送部5の動作が始まると、前記のX-Y方向の移動によって基板ストッパ2を基板10の搬送路のY方向幅の範囲で基板センサー7よりも下流の所定位置に待機する。該所定位置のX方向は例えば図3に示す位置である。そうして、基板センサー7が基板10を検出すると図4に示す矢印D方向にロッド21を押し出し、同時に装着ヘッド1はX軸駆動系6Cの電動機66の駆動でX方向矢印Hに徐々に加速し移動する。図5は基板10の搬送方向の前端が基板ストッパ2のロッド21に接触した状態を示す、接触する瞬間は基板10の搬送速度と装

着ヘッド1の矢印H方向への移動速度が等しいか極めて近い状態に電動機66の駆動を制御する。言い換えると、装着ヘッド1の移動を基板10の搬送に同期させる制御を行ない、基板10の先端にロッド21が接触するタイミング以降は装着ヘッド1の矢印H方向への移動速度を所定の減速カーブで電動機66を制御して停止するまで減速する。基板10は無端ベルト53とスリップし、基板10の位置決め手段で基板10を位置決めする個所で停止するとともに、ただちに、図6に示す如く第1の基準ピン55と第2の基準ピン56が矢印P及びP'方向に上昇して位置決めし、且つ基板支えピンによる支持が行われる。無端ベルト53の駆動はこの時点で停止するが基板10への衝撃はもう生じないタイミングである。図7は基板10の位置決めが完了して基板ストッパ2のロッド21が矢印U方向に引っ込み、基板10に対する電子部品の装着動作を行うことができる状態を示し、装着動作が完了すると基板10の位置決め手段を下降させて再び無端ベルト53を駆動すると基板10は次の工程に向かって搬送される。

【0022】以上の動作は電子部品装着装置のNC制御装置で制御される。

【0023】

【発明の効果】本発明の電子部品装着装置によれば、装着ヘッドに設けた基板ストッパの阻止部材により、基板搬送部で搬送し移動しているプリント基板を搬送速度から減速し停止させるので、装着ヘッドの移動における減速カーブを制御することでプリント基板の停止に伴う衝撃を少なくすることが可能になる。なお、一般に電子部品装着装置の装着ヘッドの移動はNC制御装置で制御され、減速カーブを任意に制御することは容易である。また、プリント基板を入れ替える時の従来の装着ヘッドは待機状態であり本発明を実施しても作業時間を増加させないし、そのうえ、従来のベルトコンベアのスローダウンを廃止して且つプリント基板の停止に伴う衝撃を一定以下に保ちながら減速し停止させる制御を最適化できるので、結果として停止位置は安定し且つ作業時間は短縮できる。また、異なる寸法のプリント基板に切り替える際の停止位置の変更をハンドルとか工具等を用いなくてNC制御装置への設定入力が可能であり変更が容易である。さらに、プリント基板の寸法にかかわらず常にプリント基板の中心を設定位置（例えばX方向の中心）に合わせることが自動的に実行可能である。同時に基板搬送路の間隔変更と基準ピンの位置変更（特開平6-32432号）を併用すると効果は倍増する。

【0024】

【図面の簡単な説明】

【図1】本発明の電子部品装着装置の実施例の全体構成を示す平面図である。

【図2】同正面図である。

【図3】実施例の基板搬送路と装着ヘッドと基板ストッ

パと位置決め手段の動作を示す正面図であり、プリント基板の搬送を開始した状態を示す。

【図 4】実施例の基板搬送路と装着ヘッドと基板ストップと位置決め手段の動作を示す正面図であり、プリント基板が基板センサーに至り検出される状態を示す。

【図 5】実施例の基板搬送路と装着ヘッドと基板ストップと位置決め手段の動作を示す正面図であり、プリント基板の先端が基板ストップのロッドに接した状態を示す。

【図 6】実施例の基板搬送路と装着ヘッドと基板ストップと位置決め手段の動作を示す正面図であり、プリント基板を位置決め手段が位置決めする状態を示す。

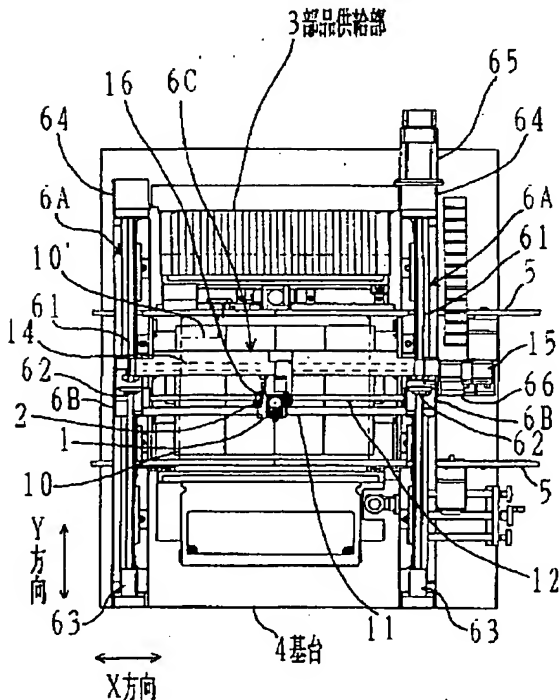
【図 7】実施例の基板搬送路と装着ヘッドと基板ストップと位置決め手段の動作を示す正面図であり、プリント基板の位置決めが完了し基板ストップのロッドが引っ込む状態を示す。

【符号の説明】

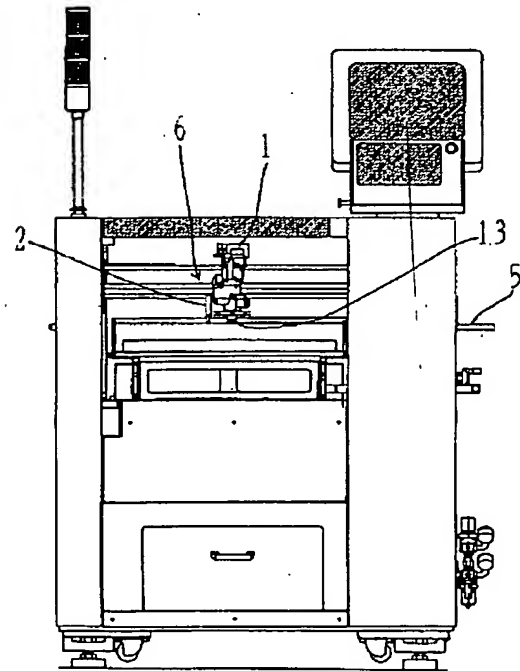
- 1 装着ヘッド
- 2 基板ストップ

- 5 基板搬送部
- 6 X-Y駆動機構
- 7 基板センサー
- 10 プリント基板
- 21 ロッド
- 51 フレーム
- 52 ローラ
- 53 無端ベルト
- 54 電動機
- 55 第1の基準ピン
- 56 第2の基準ピン
- B プリント基板の搬送方向
- D 基板ストップがロッドを出す方向
- H 装着ヘッドが移動する方向（基板搬送阻止時）
- U 基板ストップがロッドを引っ込む方向
- P 第1の基準ピンの上昇方向
- P' 第2の基準ピンの上昇方向
- X プリント基板の搬送方向
- Y プリント基板面と平行でXと垂直方向

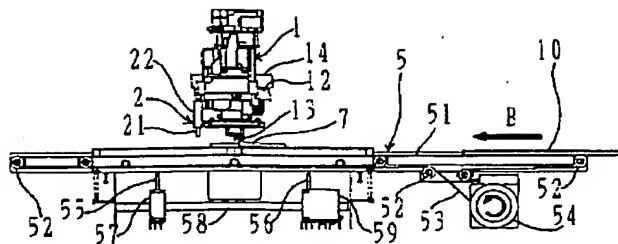
【図 1】



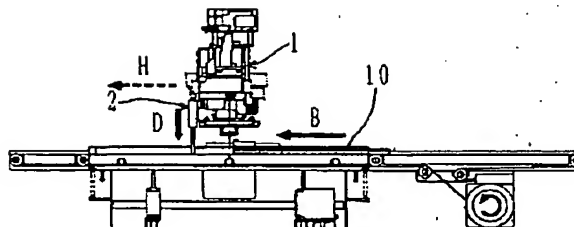
【図 2】



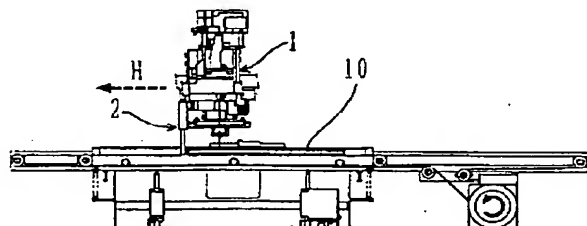
【図3】



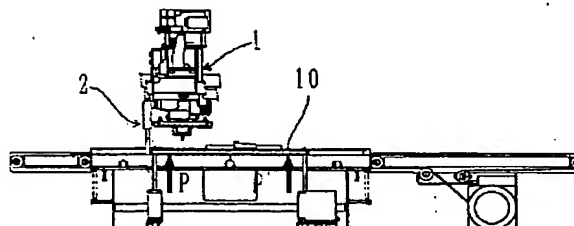
【図4】



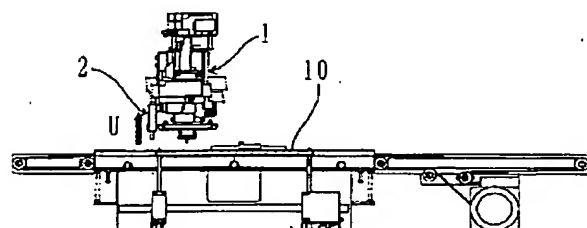
【図5】



【図6】



【図7】



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